Regular Advanced Algebra w/ Trig Semester 1 Final Review
Chapter 4 (Quadratic Functions), Glawe

Name: Key
Period: _____

1) What is the equation for the axis of symmetry of a quadratic function (in all forms)? What else can you find using the axis of symmetry? (4.1) → x-coordinate of the vertex

Standard form: $y=ax^2+bx+c$ axis of symmetry: $x=\frac{-b}{2a}$

Vertex form: $y=a(x-h)^2+k$ vertex: (h,k) $x=h$

Intercept (factored) form: $y=a(x-p)(x-q)$ $x=\frac{p+q}{2}$

Factor the following expressions: (4.3/4.4)

2) $w^2-8w+12$ $12 \mid -8$, $-6,-2$ → $(w-6)(w-2)$

3) x^2-16 difference of two squares → $(x-4)(x+4)$

4) $x^2+3x-28$ $-28 \mid 3$, $7,-4$ → $(x+7)(x-4)$

5) $3z^3-15z^2+36z$ GCF → $3z(z^2-5z+12)$ $12 \mid -5$ prime

6) $18x^2-32$ GCF → $2(9x^2-16)=$ difference of two squares → $2(3x+4)(3x-4)$

7) $3w^2-11w-4$ $-4 \cdot 3 = -12$, $-12 \mid -11$, $-12,1$

$(3w^2-12w)+(w-4)=$

$3w(w-4)+1(w-4)=$

$(3w+1)(w-4)$

Solve the following equations by *factoring*. (4.3/4.4)

8) $9x^2-3x=0$ GCF

$3x(3x-1)=0$

$3x=0$ or $3x-1=0$ $+1\ +1$

$x=0$ or $x=1/3$ $\frac{3x}{3}=\frac{1}{3}$

9) $7w^2+28w=0$ GCF

$7w(w+4)=0$

$7w=0$ $w+4=0$ $-4\ -4$

$w=0$ or $w=-4$

10) $144=25x^2$ $-144\ -144$ difference of two squares

$25x^2-144=0$

$(5x+12)(5x-12)=0$

$5x+12=0$ or $5x-12=0$ $-12\ -12$ $+12\ +12$

$\frac{5x}{5}=\frac{-12}{5}$ or $\frac{5x}{5}=\frac{12}{5}$

$x=-12/5$ or $x=12/5$

11) $25=x^2-8x+16$ $-25\ -25$

$x^2-8x-9=0$ $-9 \mid -8$, $-9,1$

$(x-9)(x+1)=0$

$x-9=0$ or $x+1=0$ $+9\ +9$ $-1\ -1$

$x=9$ or $x=-1$

12) $12x^2+5x+5=7$ $-7\ -7$

$12x^2+5x-2=0$ $12 \cdot -2 = -24$, $8,-3$

$(12x^2+8x)+(-3x-2)=0$

$4x(3x+2)-1(3x+2)=0$

$(4x-1)(3x+2)=0$

$4x-1=0$ or $3x+2=0$ $+1\ +1$ $-2\ -2$

$\frac{4x}{4}=\frac{1}{4}$ or $\frac{3x}{3}=\frac{-2}{3}$

$x=1/4$ or $x=-2/3$

Solve the following equations by *using square roots*. (4.5)

13) $4x^2+100=0$ $-100\ -100$

$\frac{4x^2}{4}=\frac{-100}{4}$

$\sqrt{x^2}=\sqrt{-25}$

$x=\pm\sqrt{-25}$

$x=\pm 5i$

opposite of G.E.M.S. so S.M.E.G.

$\sqrt{-25}$

$\sqrt{-1}\cdot\sqrt{25}$

$i \cdot 5$

14) $25=7b^2-10$ $+10\ +10$

$\frac{35}{7}=\frac{7b^2}{7}$

$\sqrt{5}=\sqrt{b^2}$

$b=\pm\sqrt{5}$

Write the following expressions as a complex number in standard form. (4.6)

15) $(2-5i)+(-1-3i)$

$2-5i-1-3i=$

$\boxed{1-8i}$

16) $(2-5i)-(-1-3i)$

$2-5i+1+3i=$

$\boxed{3-2i}$

17) multiply by conjugate FOIL

$\frac{(2-3i)}{(4+i)}\cdot\frac{(4-i)}{(4-i)}$ $+i^2=-1$

$\frac{8-12i-2i+3i^2}{16-4i+4i-i^2}=$

$\frac{8-14i-3}{16+1}=\boxed{\frac{5-14i}{17}}$

18) If $(ax+2)(3x-5b)-bx^2=-11x^2+36x-20$, what is the value of $a+b$? (4.3/4.4)

FOIL

$3ax^2-5abx+6x-10b-bx^2=-11x^2+36x-20$

↳ constant term (no x)

$\frac{-10b}{-10}=\frac{-20}{-10}$ $b=2$

Quadratic terms:

$3ax^2-bx^2=-11x^2$

$3ax^2-2x^2=-11x^2$

$\frac{3ax^2}{3x^2}=\frac{-9x^2}{3x^2}$

$a=-3$

$a+b=2+(-3)$

$=\boxed{-1}$

19) Write a quadratic function in vertex form with the vertex (-1, -4) and passes through the point (2, -1). How has this graph shifted from the original quadratic parent function? (4.10)

$y=a(x-h)^2+k$ Vertex: (h,k)

$y=a(x+1)^2-4$ $-1=a(3)^2-4$

$-1=a(2+1)^2-4$ $-1=9a-4$

$+4\quad+4$

$\frac{3}{9}=\frac{9a}{9}$

$a=3/9=1/3$

$\boxed{y=\frac{1}{3}(x+1)^2-4}$

graph is shifted to the left one and down four from parent function (look at vertex)

Simplify the following expressions. (4.5)

20) $\sqrt{10}\cdot\sqrt{15}=\sqrt{150}=\sqrt{25\cdot6}=$

$\sqrt{25}\cdot\sqrt{6}$

5

$\boxed{5\sqrt{6}}$

22) $\sqrt{\frac{5}{2}}=\frac{\sqrt{5}}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{\sqrt{10}}{\sqrt{4}}=\boxed{\frac{\sqrt{10}}{2}}$

21) distribute

$\frac{2}{6-\sqrt{8}}\frac{(6+\sqrt{8})}{(6+\sqrt{8})}=$ multiply by conjugate FOIL

$\frac{12+2\sqrt{8}}{36+6\sqrt{8}-6\sqrt{8}-\sqrt{64}}=\frac{12+2\sqrt{8}}{36-8}=\frac{12+2\sqrt{8}}{28}=$

$2\sqrt{8}$

$\sqrt{4}\cdot\sqrt{2}$

$2\cdot2\sqrt{2}=4\sqrt{2}$

$\frac{12+4\sqrt{2}}{28}=\boxed{\frac{3+\sqrt{2}}{7}}$

Solve the using the quadratic formula. (4.8)

23) $y=x^2+6x+4$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-6\pm\sqrt{(6)^2-4(1)(4)}}{2(1)}$

$=\frac{-6\pm\sqrt{36-16}}{2}$

$=\frac{-6\pm\sqrt{20}}{2}=\frac{-6\pm2\sqrt{5}}{2}=\boxed{-3\pm\sqrt{5}}$

$\sqrt{20}$

$\sqrt{4}\cdot\sqrt{5}$

$2\sqrt{5}$

24) $y=2x^2-16x+50$

$x=\frac{-(-16)\pm\sqrt{(-16)^2-4(2)(50)}}{2(2)}=\frac{16\pm\sqrt{256-400}}{4}=$

$\sqrt{-144}$

$\sqrt{-1}\cdot\sqrt{144}$

$i\quad12$

$\frac{16\pm\sqrt{-144}}{4}=\frac{16\pm12i}{4}=\boxed{4\pm3i}$

Solve the inequality algebraically, write the solution in **interval notation**. (4.9)

25) $x^2+2x-3>0$

$x^2+2x-3=0$

$(x+3)(x-1)=0$

$x+3=0$ or $x-1=0$

$x=-3$ or $x=1$

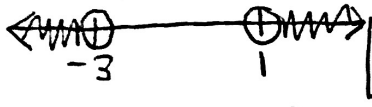
$-3\quad|\quad2$

$3,-1$

Test $x=0$:

$0^2+2(0)-3>0$

$-3>0$ NO



$\boxed{(-\infty,-3)\cup(1,\infty)}$

26) $x^2-3x\le10$

$x^2-3x=10$

$-10\quad-10$

$x^2-3x-10=0$

$(x-5)(x+2)=0$

$x-5=0$ or $x+2=0$

$+5\quad+5\qquad-2\quad-2$

$x=5$ or $x=-2$

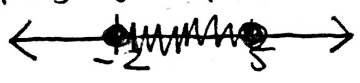
$-10\quad|\quad-3$

$-5,2$

Test $x=0$:

$0^2-3(0)\le10$

$0\le10$ Yes



$\boxed{[-2,5]}$